A COLOR TV SOUND SYSTEM USING THE μA703

by Larry Blaser

INTRODUCTION

This bulletin describes a 4.5-MHz intercarrier sound system for a color television receiver. The circuit uses an integrated circuit, the μA703, IF amplifier followed by a ratio detector. The sound IF amplifier is driven from a power sound detector transistor which is fed from the final video IF amplifier stage.

INTEGRATED CIRCUIT AMPLIFIER

A schematic representation of the μA703C integrated circuit (IC) used in the sound IF amplifier is shown in Figure 1. This IC has been designed to operate as an FM-IF amplifier with transformer coupled input and output.[1]

The input is applied between the bases of the emitter-coupled amplifying transistors, Q_A and Q_B. The base of Q_B is ac bypassed to ground by the diode-connected transistors, Q_C and Q_E. The output is taken from the collector of Q_B.

The collector of Q_A is decoupled to ground by an external capacitor. The supply voltage is fed through the 100-ohm decoupling resistor. Biasing transistors Q_C, Q_D, and Q_E and the 2.5-KΩ resistor are used to set up a current source for the amplifying transistors, Q_A and Q_B.

As a small signal amplifier, the common-collector transistor, Q_A, drives the common-base transistor, Q_B. Under large signal conditions, Q_A operates as a switch which chops the current from Q_D to the emitter of Q_B at the signal frequency rate. Depending on the load presented to the output, the μA703 can be operated in either a saturating or nonsaturating mode under large signal conditions.

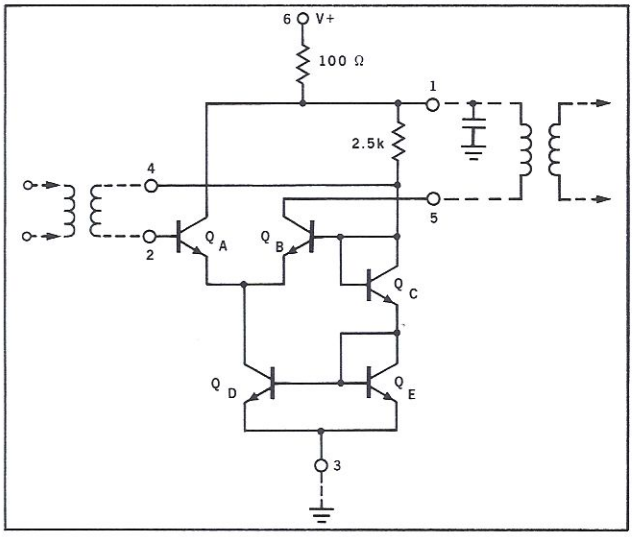

Fig. 1. μA703 integrated circuit.

COLOR TV SOUND SYSTEM

In a color TV, the 4.5-MHz sound IF is not generated in the video detector as it is in a black and white receiver. In the circuit shown in Fig. 2, a separate transistor power sound detector driven from the final video IF amplifier stage is used to develop the 4.5-MHz intercarrier sound IF. The μA703C driver transformer in the collector of the power detector transistor is tuned to 4.5 MHz and has a small signal, loaded Q of 30. The output of μA703C drives a conventional ratio detector. The ratio detector load presented to the μA703C is selected to achieve high stage gain. With

1. Barrett, Blaser and Suzuki, "An FM Tuner Using MOS-FET's and Integrated Circuits", IEEE Transactions on Broadcast and Television Receivers, pp 24-32; July 1965. Also available as Fairchild Semiconductor Technical Paper, TP-31.

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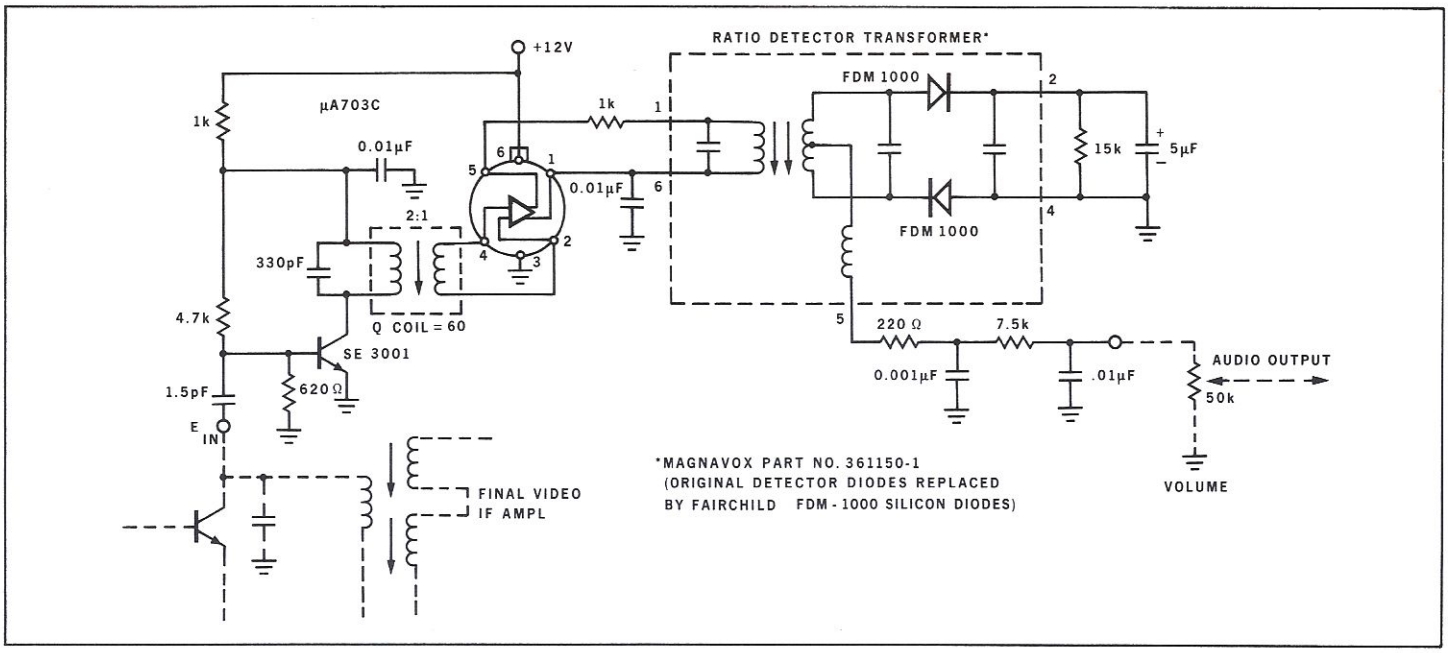


Fig. 2. Color TV sound system.

the resulting, relatively high load impedance, the μA703 output "bottoms" at full limiting. The ratio detector provides good AM rejection well below full limiting. The measured performance of the color sound IF is given in Fig. 3. For test purposes, the voltage ratio of the 45.75-MHz video carrier input to the 41.25-MHz sound carrier input was maintained at 3:1 (10 db) for all signal levels. This ratio is based on the relation of video-to-sound transmitter power and a typical video IF response to the sound take-off point. A printed circuit layout for the complete circuit is given in Fig. 4.

CONCLUSION

A color TV sound system has been described which used a single integrated circuit 4.5-MHz IF amplifier. Under normal signal conditions, the system operates in full limiting, with excellent AM rejection and distortion characteristics. (Typical inputs for the color TV sound system are 2.5 volts at 45.75 MHz and 850 millivolts at 41.25 MHz.) Sound quality is good under reduced signal strength conditions, which would be encountered with fringe area reception.

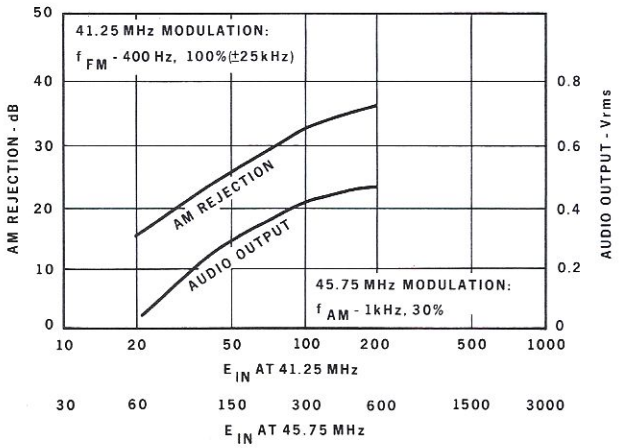
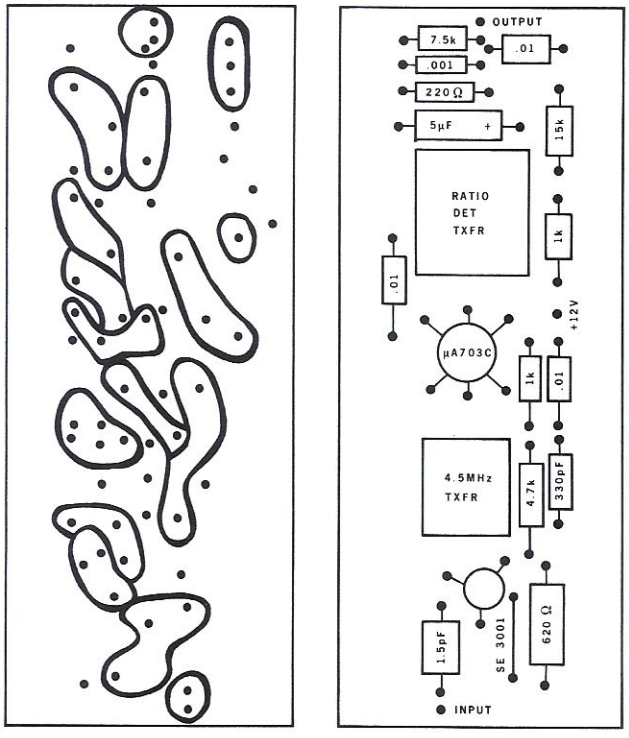


Fig. 3. Sound system performance.



Circuit Side

Component Side

Fig. 4. Printed circuit layout.